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GB 2353837 A US 5659922 A US 4405346 A

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Online: WPI, EPODOC, PAJ

(54) Abstract Title

Latch arrangement for a vacuum cleaner dirt receptacle

(57) Three inventions are claimed in this application, the first being characterised by a dirt cup latching arrangement for a vacuum cleaner where the dirt cup is removably retained in a recess in the front of vacuum cleaner housing. The latching member retains the dirt cup by applying a horizontal force against the rear wall of the recess and also a vertical force against either the top or bottom wall of the recess.

The second invention is characterised by a vacuum cleaner having a dirt cup latch that engages with the lid of the dirt cup and securing the cup within the recess with only a vertical force.

A further invention claims a latching arrangement including a latch cam, latch plate and cam sleeve whereby the latch plate is moved vertically in order to retain the dirt cup.

In the described embodiment, a latch mechanism secures a vacuum cleaner dirt cup 10 in position. The dirt cup is removably placed in a recess in the front of a dirt cup housing 4. The dirt cup has an air inlet (60) on the rear wall (46) and an air outlet (62) in the bottom wall (44) of the dirt cup. In order to maintain a good seal at both of these apertures, a latch mechanism is provided that pushes the dirt cup downwards and rearwards. The latch mechanism may engage the dirt cup or the lid 42 of the dirt cup and comprises a latch plate 100, a cam sleeve 102 and a latch cam 104. The latch cam 104 includes a cylindrical portion 120 and a latch actuation lever 124.

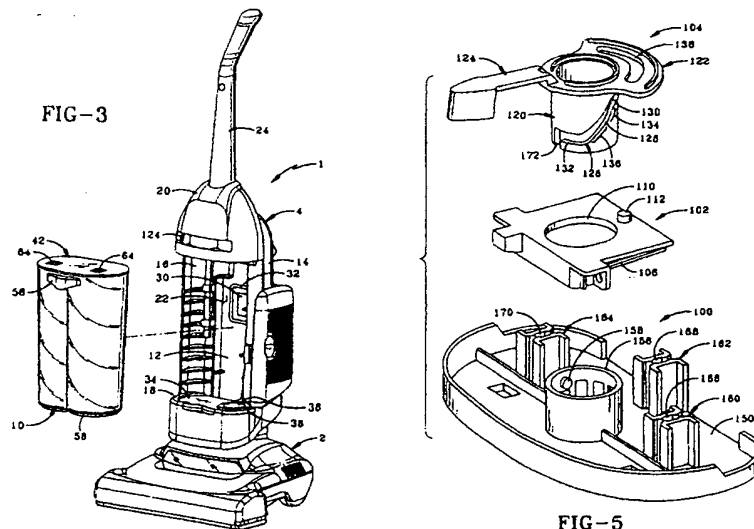


FIG-1

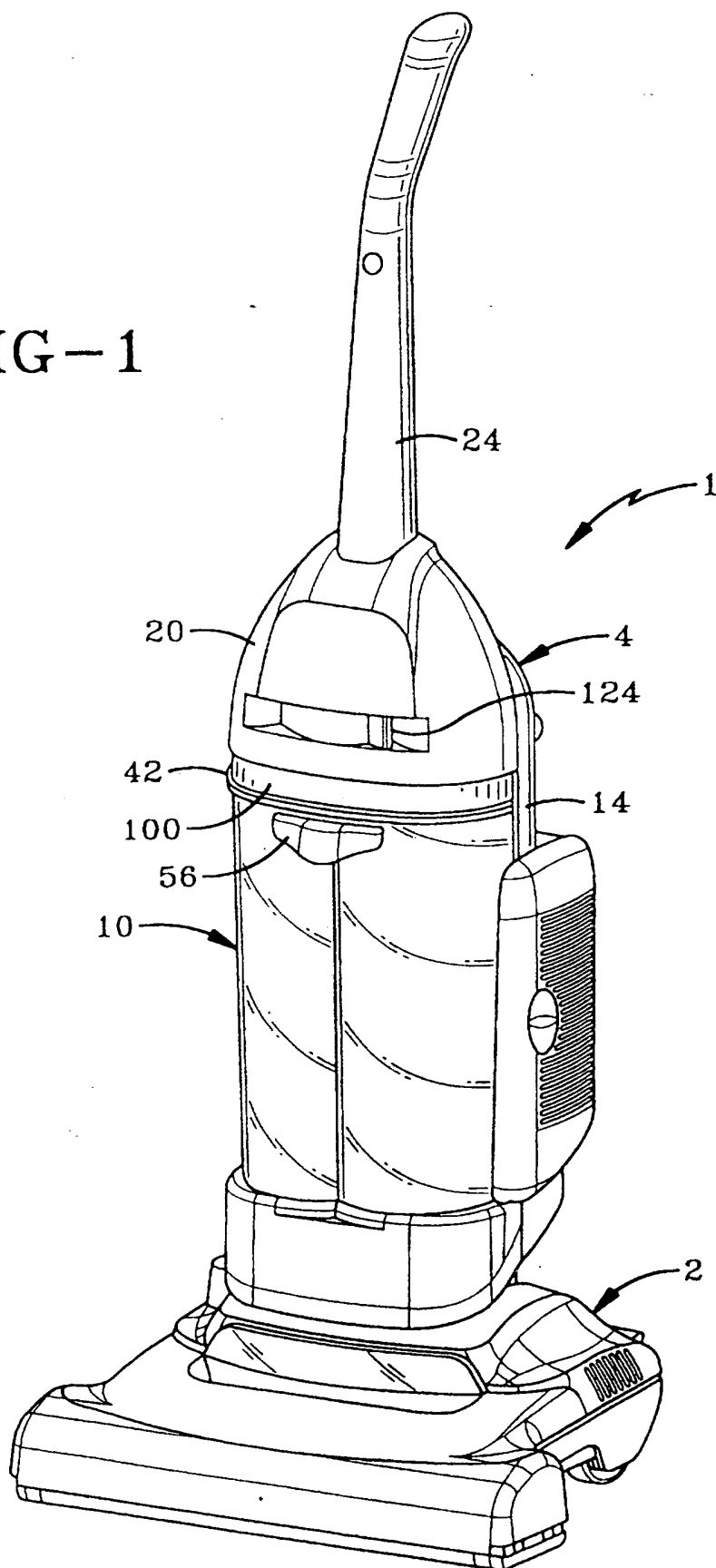


FIG-2

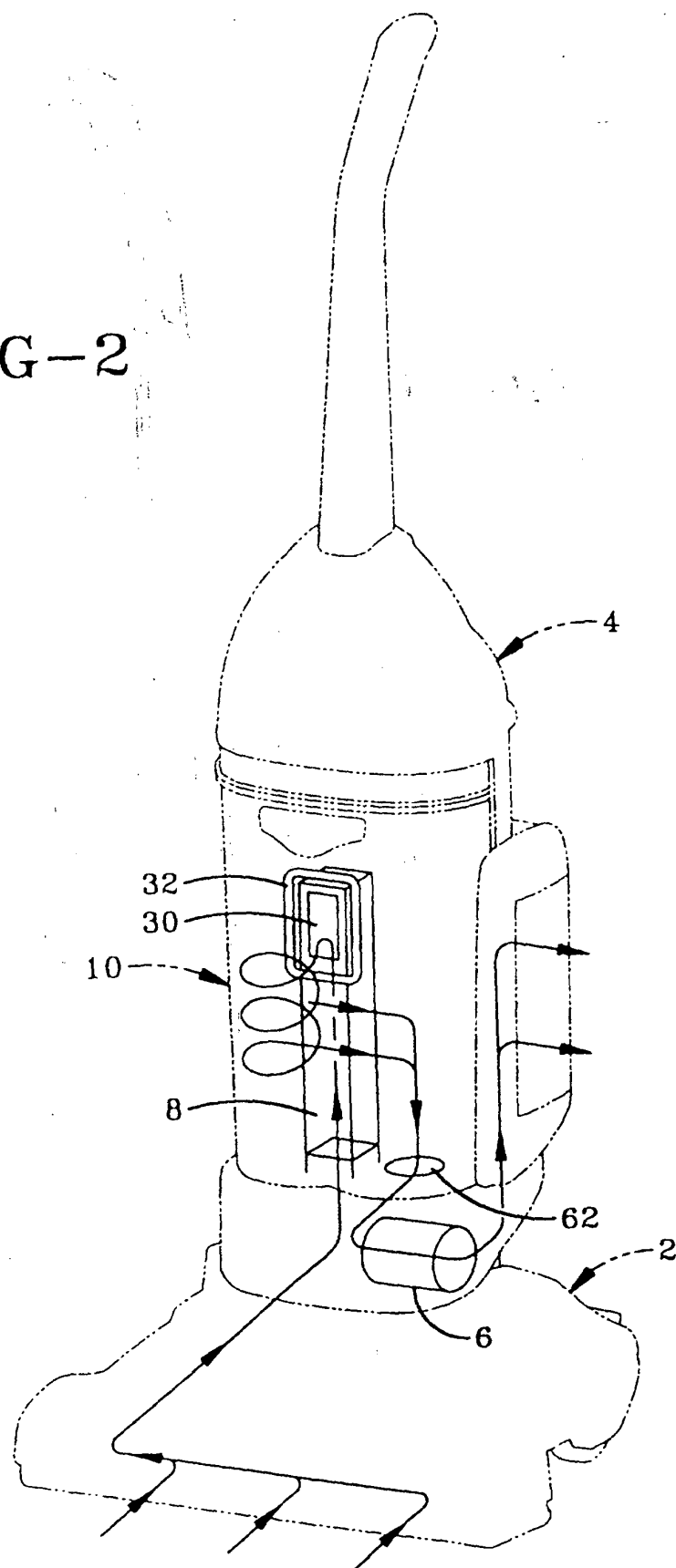
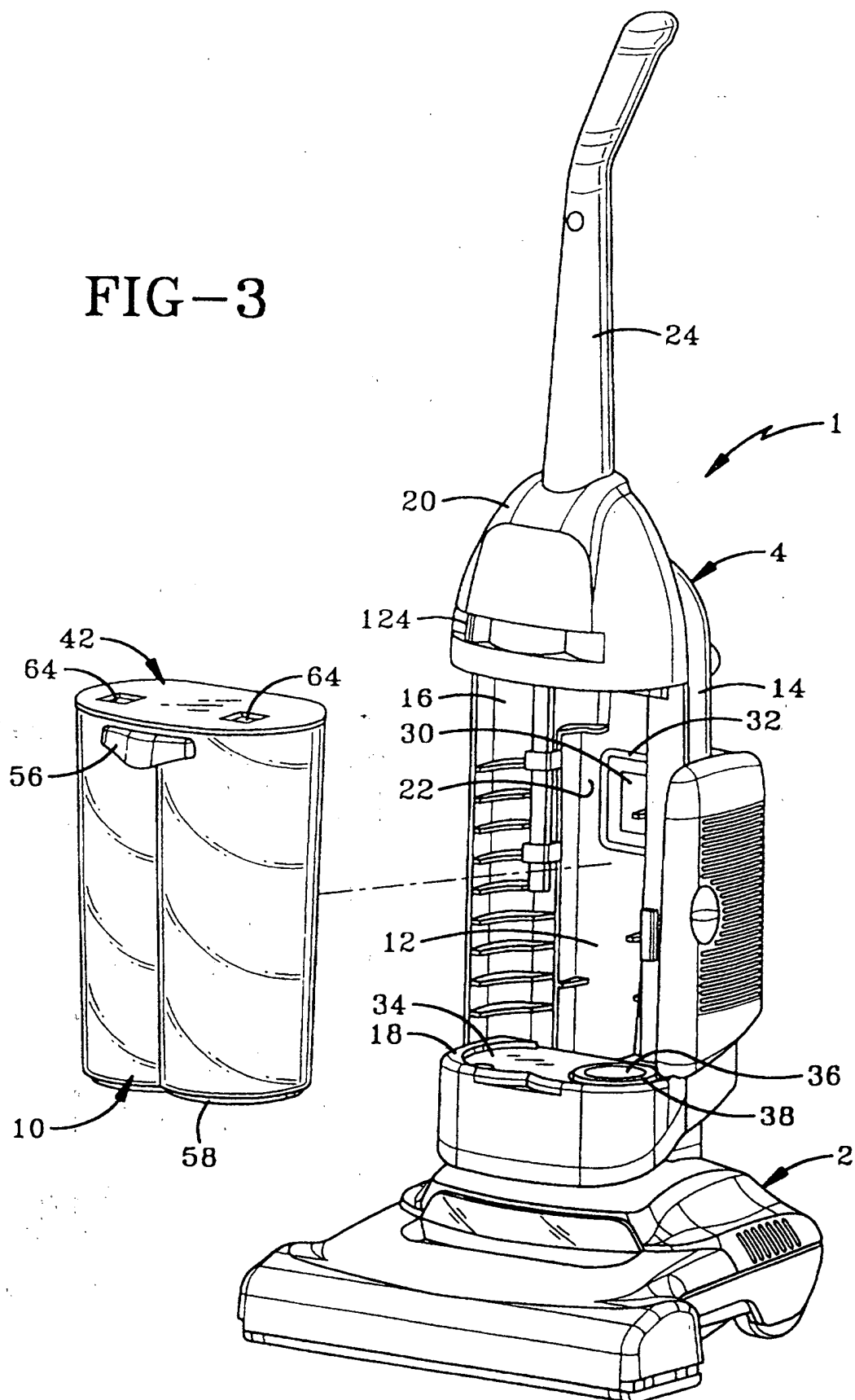


FIG-3



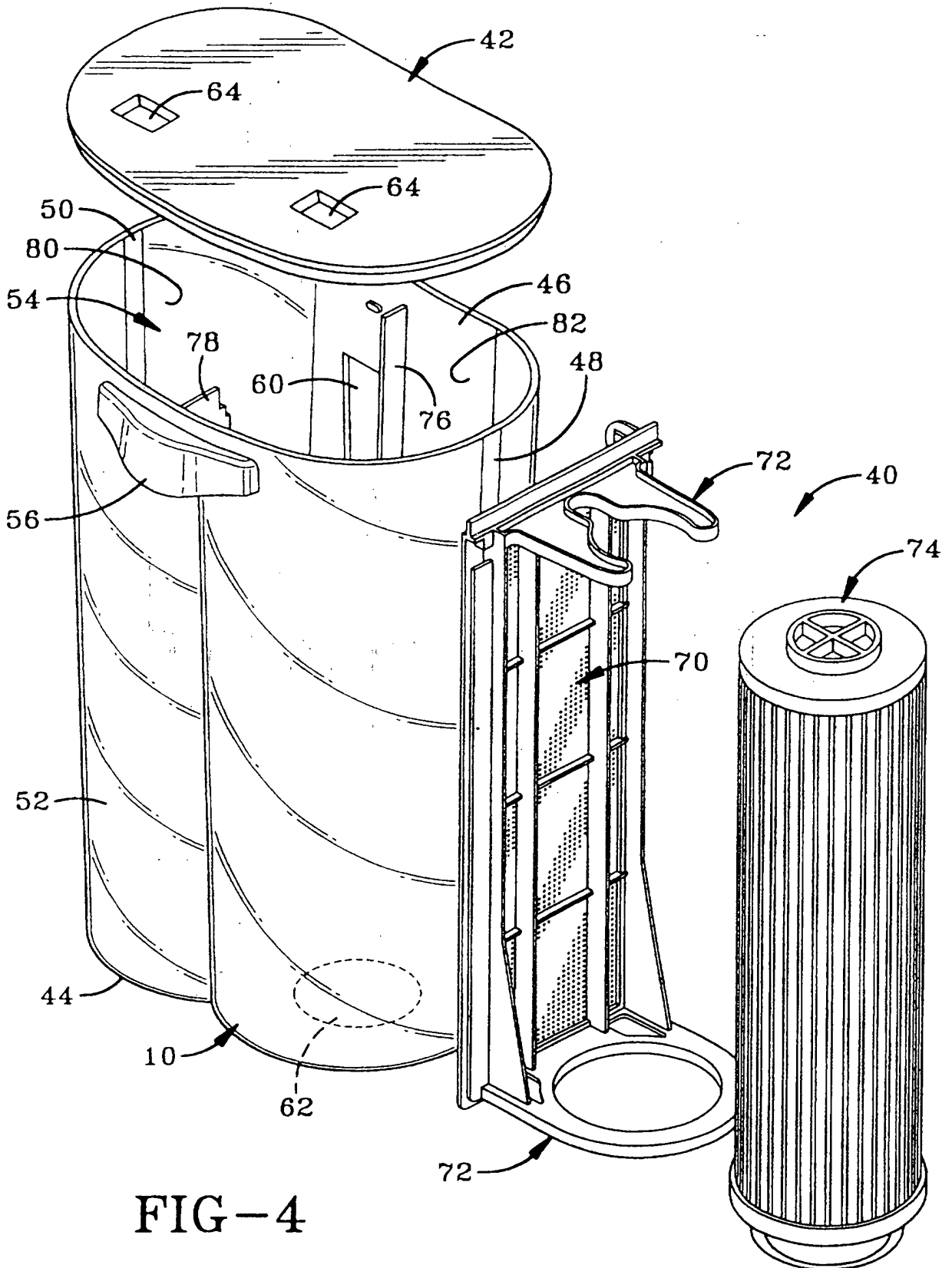


FIG-4

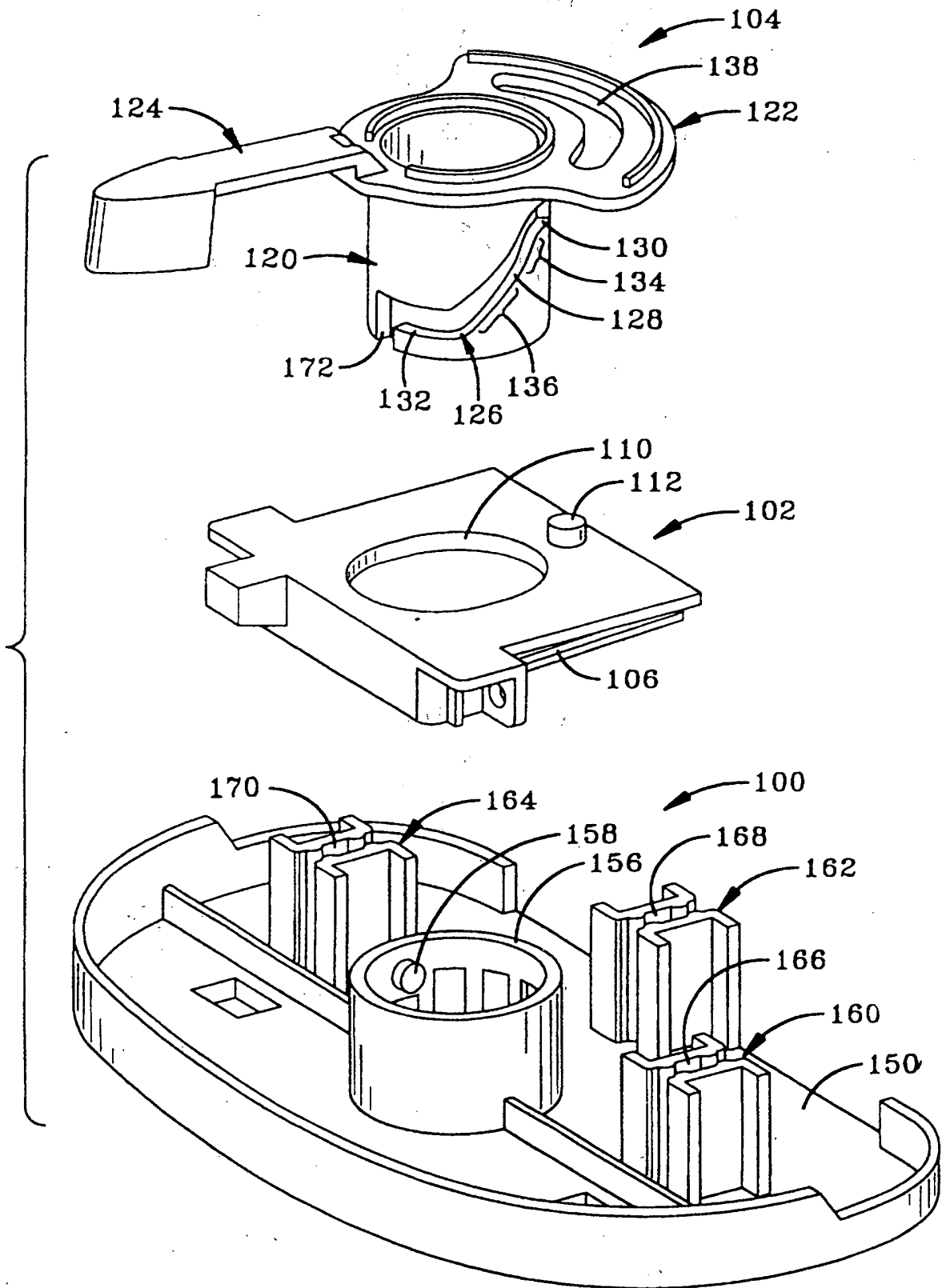
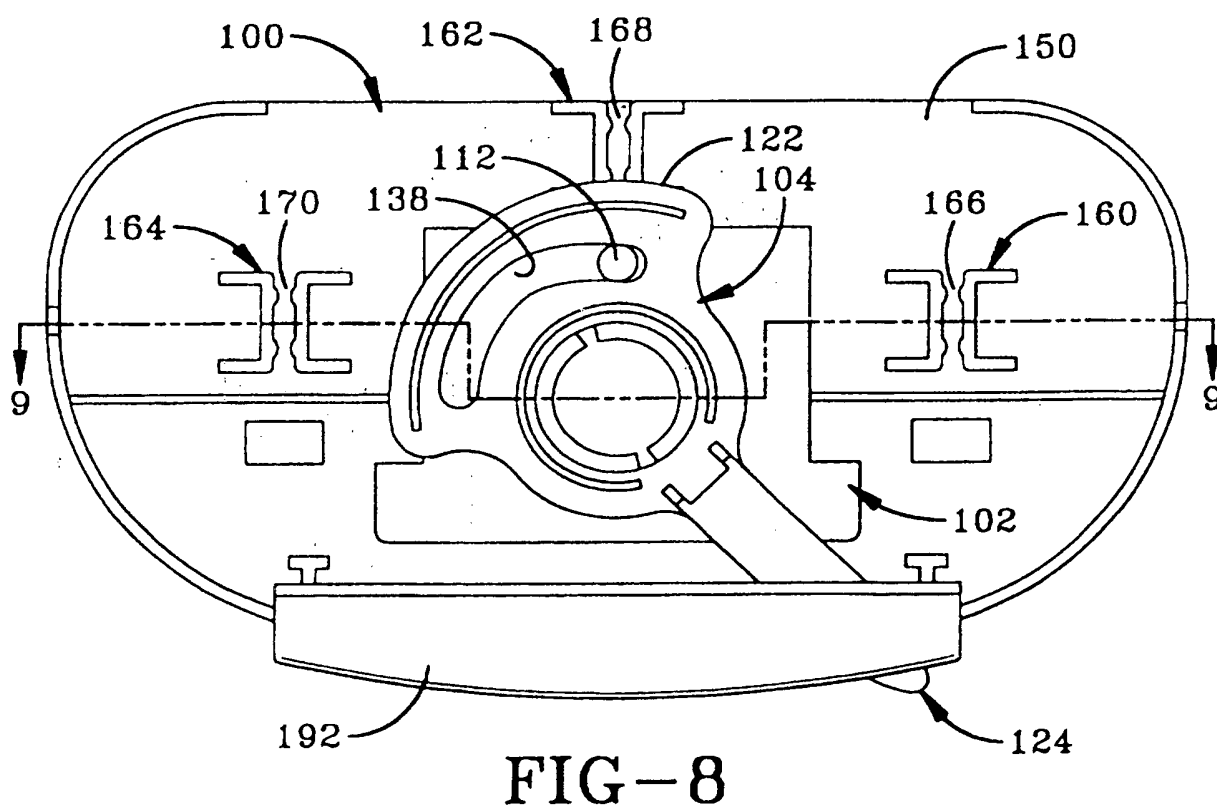
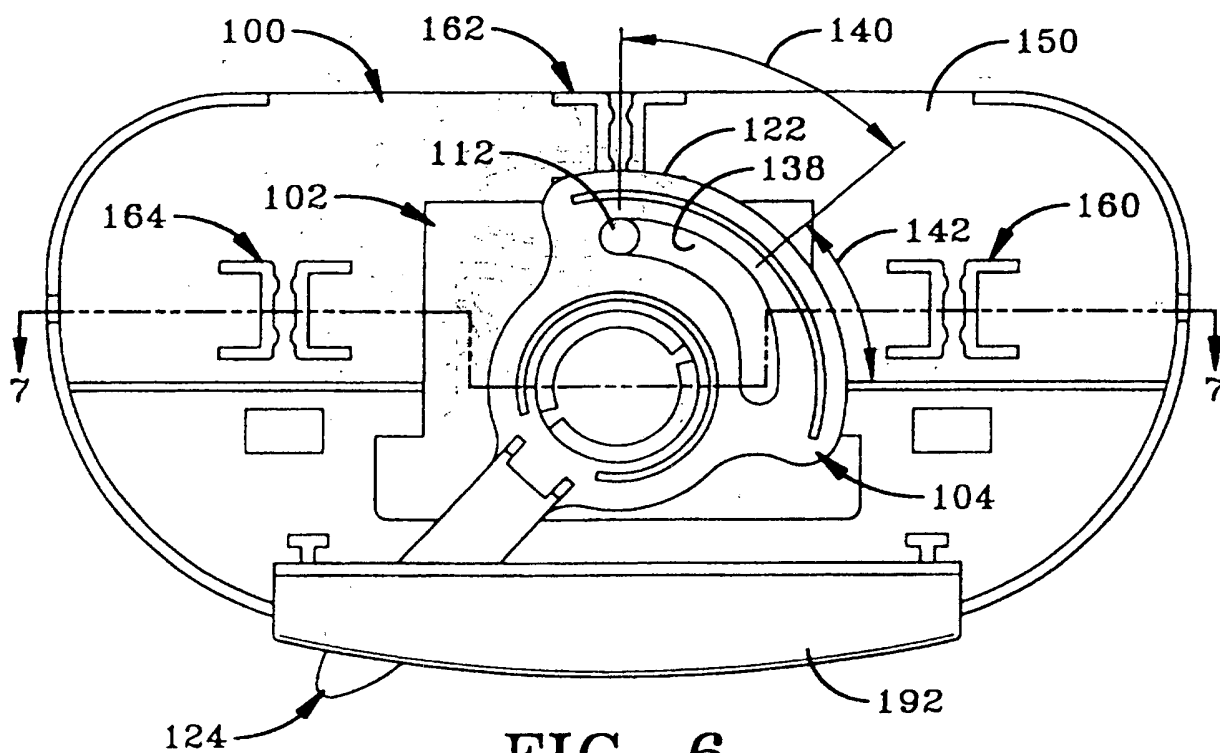


FIG-5



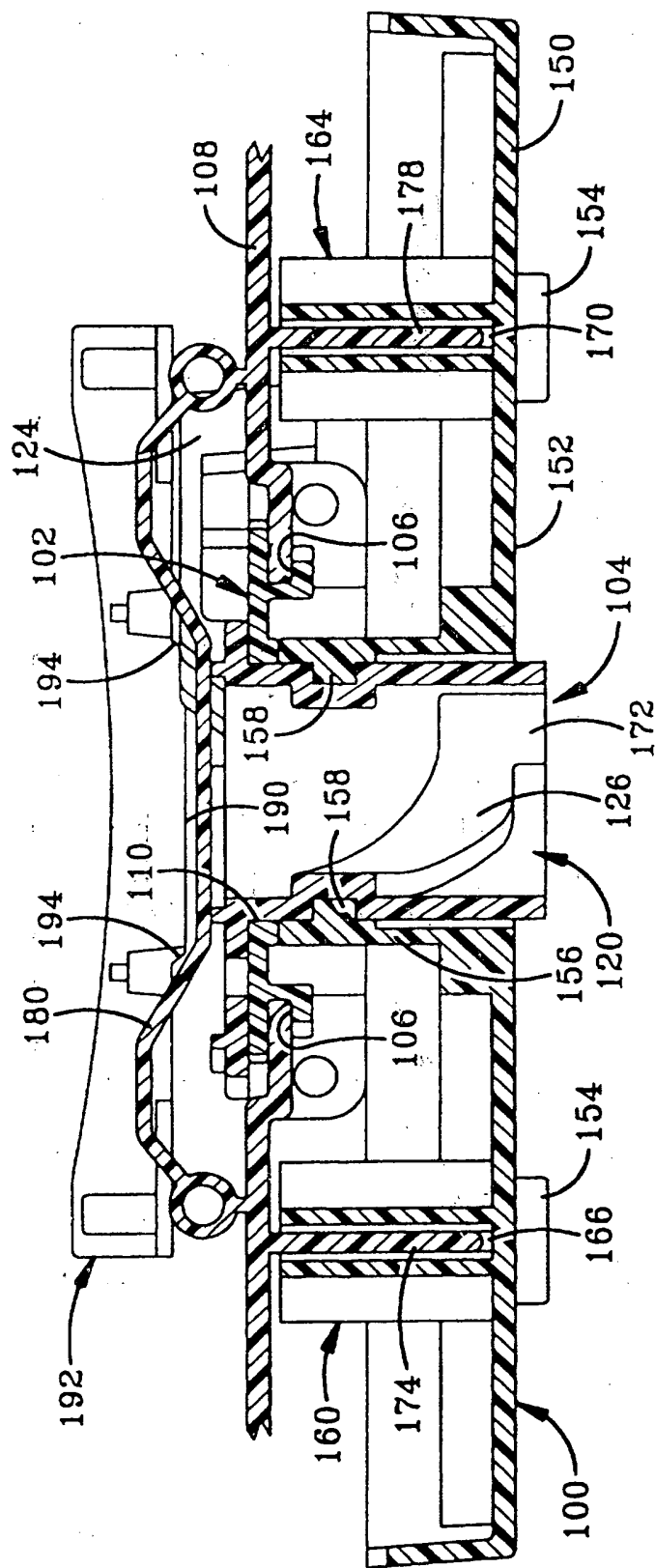


FIG-7

00 4 01

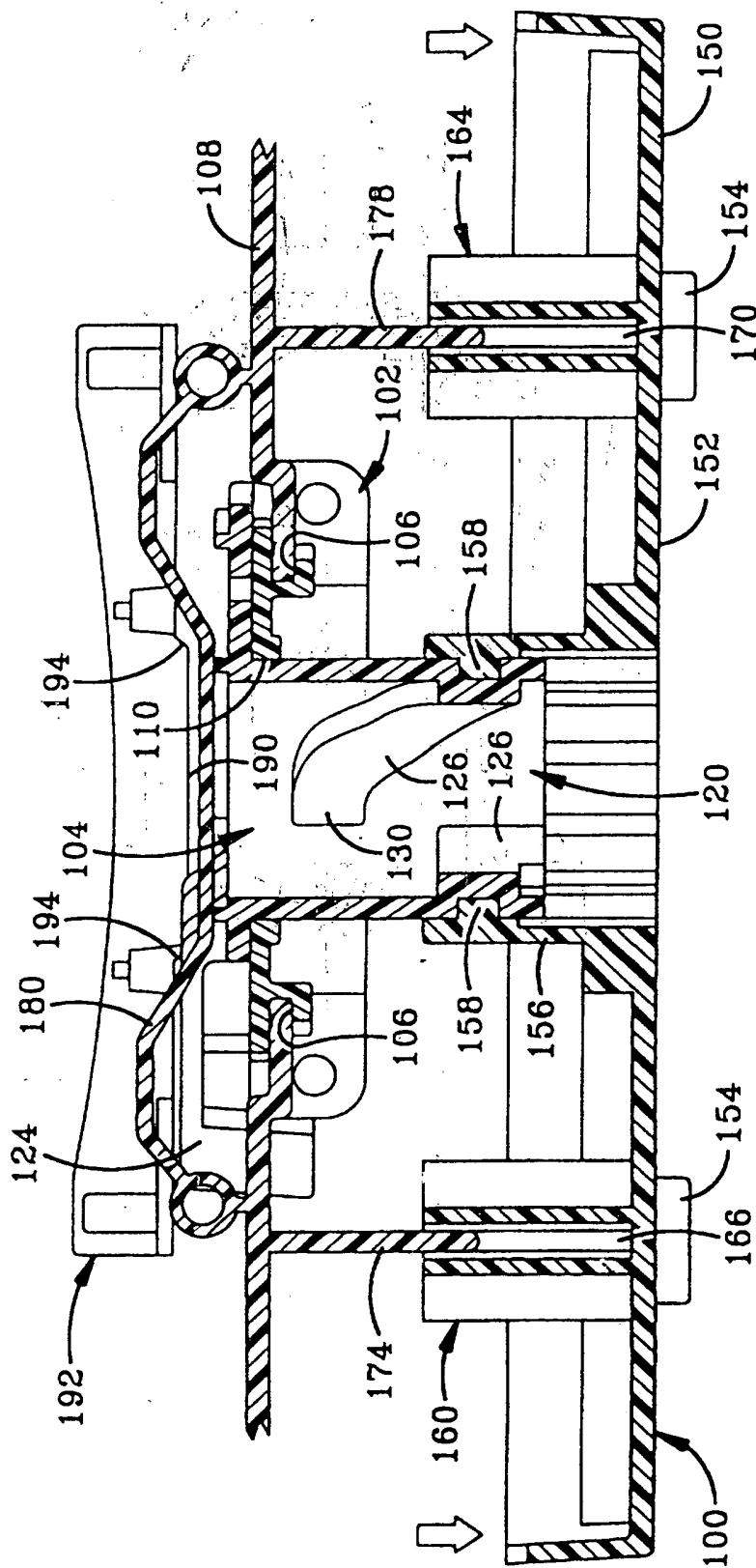


FIG-9

LATCH ARRANGEMENT FOR A VACUUM CLEANER DIRT RECEPTACLE

BACKGROUND OF THE INVENTION

Technical Field

The invention pertains to a latch arrangement for securing a dirt collecting receptacle in place on a vacuum cleaner.

Background Information

Upright vacuum cleaners are well known in the art. Typically, these upright vacuum cleaners include a vacuum cleaner housing pivotally mounted to a vacuum cleaner foot. The foot is formed with a nozzle opening and may include an agitator mounted therein for loosening dirt and debris from a floor surface. A motor may be mounted to either the foot or the housing for producing suction at the nozzle opening. The suction at the nozzle opening picks up the loosened dirt and debris and produces a stream of dirt-laden air which is ducted to the vacuum cleaner housing.

In conventional vacuum cleaners, the dirt laden air is ducted into a vacuum cleaner filter bag supported on or within the vacuum cleaner housing. However, bagless vacuum cleaners have recently become prevalent in the marketplace. These bagless vacuum cleaners duct the stream of dirt-laden air into a dirt receptacle or dirt cup having a dirt collecting system that filters the dirt particles from the air stream before exhausting the filtered air stream into the atmosphere. Various latching arrangements have been employed on these bagless vacuum cleaners to securely latch the dirt receptacle in place on the vacuum cleaner. Although these latch arrangements are adequate for the purpose for which they are intended, they are frequently cumbersome and difficult to use. There is a need in the art for a new and improved arrangement for securely latching a dirt collecting receptacle in place on a vacuum cleaner that is easy to use, securely retains the dirt cup in place on the cleaner,

and effectively presses the receptacle against receptacle inlet and outlet seals on the cleaner's housing. There is also a need in the art for a vacuum cleaner dirt receptacle latching arrangement that securely retains a lid on an open top of the receptacle, as well as retaining the receptacle in place on the cleaner.

SUMMARY OF THE INVENTION

An objective of the present invention is to provide a new and improved latch mechanism that securely and removably latches a dirt receptacle in place on a vacuum cleaner.

A further objective is to provide a new and improved latch mechanism that securely and removably latches a dirt receptacle in place on a vacuum cleaner, while simultaneously securing a lid in place on the receptacle.

A still further objective is to provide a new and improved latching mechanism for latching a dirt cup in place on a bagless vacuum cleaner that is easy to operate.

Another objective is to provide a new and improved latching mechanism that latches a dirt receptacle in place on a vacuum cleaner, and presses the receptacle against receptacle inlet and outlet seals located on the vacuum cleaner.

Yet a further objective is to provide a latch mechanism that presses the receptacle simultaneously down on a first seal that seals against the bottom wall of the receptacle and horizontally against a second seal that seals against a sidewall of the receptacle.

These and other objectives will be readily apparent to one of skill in the art upon reviewing the following description and accompanying drawings.

These objectives are achieved by the present invention, which provides a dirt cup latching arrangement for a vacuum cleaner comprising a dirt cup housing having a recess formed in a front side thereof, said recess having a rear wall and at least one of a top and a bottom wall; a dirt cup for collecting dirt picked up by the vacuum cleaner, said dirt cup being sized to be removably placed in said recess; said dirt cup housing including a dirt cup latch for securely latching said dirt cup in place in said recess, said dirt cup latch including a latch member that is mounted to said

housing on a side of said recess opposite from said at least one of a top and bottom wall; and wherein said latch member is mounted to move generally vertically relative to said housing into engagement with a top of said dirt cup to vertically retain said dirt cup between said at least one of a top and bottom wall and said latch member, and to move generally horizontally relative to said housing to horizontally retain said dirt cup between said rear wall and said latch member.

The present invention also provides a vacuum cleaner comprising a housing having a recess formed therein, said recess having a bottom wall; a dirt collecting cup having a lid, said cup being sized and shaped to be received in said housing and rest on said bottom wall; and a dirt cup latch mounted to said housing, said latch being movable from an unlatched position, in which said latch does not engage said cup or said lid, into a latched position, in which said latch engages said lid and press said lid sealingly in place on said cup and presses said cup, via said lid, against said bottom wall and thereby secure said cup in said recess.

BRIEF DESCRIPTION OF DRAWINGS

One form of the present will now be described by way of example with reference to the attached drawings, of which;

FIG. 1 is a perspective view of a vacuum cleaner incorporating a dirt receptacle latching arrangement according to one form of the present invention;

FIG. 2 is a diagrammatic view showing the vacuum cleaner of FIG. 1 illustrating the airflow through the vacuum cleaner;

FIG. 3 is a perspective view of the vacuum cleaner of FIG. 1 showing the dirt receptacle removed from the cleaner;

FIG. 4 is a perspective exploded view of the dirt receptacle according to one form of the present invention;

FIG. 5 is an exploded perspective view of the latching mechanism according to one form of the present;

FIG. 6 is a top view of the latching mechanism according to one form of the present invention shown in the unlatched position, the latching mechanism is illustrated in Fig. 5 separate from the rest of the cleaner for clarity;

FIG. 7 cross-sectional view taken along line 6-6 in Fig. 5, showing the latching mechanism mounted in the cleaner housing in the unlatched position;

FIG 8 is a top view of the latching mechanism shown in the latched position, the latching mechanism is illustrated in Fig. 8 separate from the rest of the cleaner for clarity; and

Fig. 9 cross-sectional view taken along line 8-8 in Fig. 7, showing the latching mechanism mounted in the cleaner housing in the latched position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A vacuum cleaner incorporating a dirt receptacle or dirt cup latching arrangement according to one form of the present invention is shown in Fig. 1 and generally indicated as 1. Vacuum cleaner 1 includes a vacuum cleaner foot 2 and a vacuum cleaner housing 4 connected to the vacuum cleaner foot 2. The foot 2 is formed with a bottom suction nozzle inlet opening (not shown) which opens toward a floor surface. A conventional agitator (not shown) is positioned within an agitator chamber which communicates with the nozzle opening. The agitator rotates about a horizontal axis for loosening dirt from the floor surface.

With reference to FIG. 2, a motor-fan assembly 6 is positioned within the lower end of the housing 4 and is fluidly connected to the agitator chamber via a dirt duct in the foot(not shown), a dirt duct 8 on the housing 4, and a dirt cup 10. It will be appreciated that although the motor-fan assembly 6 is shown positioned within the housing 4, the motor-fan assembly may alternatively be positioned within the foot 2, without affecting the concept of the invention. The motor-fan assembly creates a suction in the dirt cup 10, which, in turn, creates a suction in the dirt duct 8 on the housing, the dirt duct in the foot 2, the agitator chamber and nozzle opening. The suction draws air and loosened dirt from the floor surface in through the nozzle opening and creates a stream of dirt-laden air which travels through the agitator chamber, the dirt ducts, the dirt cup (where the dirt is separated from the air and collected), the motor-fan assembly, and exhausted to atmosphere, as illustrated by arrows in FIG. 2.

Referring now to FIG. 3, the vacuum cleaner housing 4 is formed with a rear wall 12, a pair of side walls 14 and 16 extending forward from the rear wall, a bottom wall 18 and a top handle cover 20. The rear wall 12, side walls 14 and 16, bottom wall 18, and top handle cover 20 define a forward facing cavity 22 for receiving the dirt cup 10. The top handle cover tapers upwardly to an upper handle 24 of the vacuum cleaner 1 and houses the dirt cup latching mechanism, which will be described in detail below. A latch actuation lever 124 is located in a front central indented area of the top handle cover for selectively placing the latching mechanism in its latched and unlatched positions, as further discussed below.

The dirt duct 8 (FIG. 2) extends up the rear of the housing 4 and extends through an opening in the rear wall 12 of the housing into the cavity 22. The end of the dirt duct located in the cavity terminates in a dirt duct outlet opening 30. A dirt cup inlet seal 32, mounted to the rear wall 12, is positioned about the end of the dirt duct and forms an air tight seal with the dirt duct. The inlet seal also forms a face seal that seals against a rear wall of the dirt cup, as described in further detail below. The bottom wall 18 of the cavity 22 is formed with a recessed area 34 for receiving and supporting the dirt cup 10. A circular exhaust opening 36 is formed in the bottom wall 18. An outlet seal 38 mounted to the bottom wall extends about the exhaust opening and forms a face seal that seals against a bottom wall of the dirt cup. The exhaust opening 36 communicates with the inlet of the motor-fan assembly 6 (FIG. 2).

The dirt duct 8 may be integrally formed with the housing 4 or it may be a separate element that is attached to the housing, either within the cavity 22 or on the rear of the housing. When located on the rear of the housing, the dirt duct 8 may be partially or entirely formed of transparent material, whereby an operator may observe any blockage of the duct requiring removal. It is understood that although the dirt duct 8 is illustrated as being provided as part of the housing 4, the dirt duct may alternatively be formed integrally with the dirt cup 10, as disclosed in commonly owned U.S. Patent Application Serial no. 09/519,106, filed on March 6, 2000, the disclosure of which is hereby incorporated herein as of reference.

One form of a dirt cup assembly envisioned by the inventors is illustrated in FIG. 4. The dirt cup assembly includes the dirt cup 10, a filter assembly 40 removably mounted within the dirt cup, and a removable dirt cup lid 42 that encloses the open top of the dirt cup. The dirt cup includes a bottom wall 44, a generally flat rear wall 46, a pair of curved side walls 48 and 50, and a front wall 52. The rear wall, side walls and front wall extend upward from the bottom wall to form a dirt cup chamber 54. A handle 56 is provided in the center of the front wall near the top of the dirt cup, whereby a user may grasp the handle with one hand in order to remove the dirt cup assembly from or place the dirt cup assembly on the vacuum cleaner 1. The lower surface of the bottom wall of the dirt cup is formed with an inwardly stepped portion 58 (FIG. 3) which is matingly received within the recessed area 34 of the housing support of bottom wall 18. An inlet port 60 is formed in the rear wall 46 near the top of the dirt cup and an outlet port 62 is located in the bottom wall 44 of the dirt cup. In the present embodiment, the dirt cup is a one-piece member molded of substantially transparent ABS and may include an anti-static additive to prevent dirt from electro-statically adhering to the walls of the dirt cup. The lid is sealingly telescopically received on the open top of the dirt cup. A pair of recesses or pockets 64 are formed in the upper surface 60 of the lid for engagement by the latching mechanism, as described below.

One form of a filter assembly 40 envisioned by the inventors includes an apertured wall 70, a filter support 72 extending from the apertured wall, and a primary filter 74 removably mounted on the filter support. The filter assembly 40 is mounted in the dirt cup by suspending the filter assembly on flanges 76 and 78 integrally formed with the front 46 and rear 52 walls of the dirt cup. The apertured wall 70 separates the dirt cup chamber into a first dirt collecting chamber 80 and a second dirt collecting chamber 82. A plurality of apertures formed in the apertured wall provide fluid communication between the first dirt collecting chamber and the second dirt collecting chamber. The primary filter 74 is formed as a hollow cylindrical tube of pleated HEPA grade filter material that is closed at the top and sealingly communicates with the dirt cup outlet port 62 at the bottom.

The apertured wall 70 functions as a coarse particle separator or pre-filter that separates relatively large, coarse particles from the air stream. The coarse particles are collected in the first dust collecting chamber 80. The primary filter 74 functions as a fine particle separator that separates the fine particles from the air stream. The fine particles are collected in the second dust collecting chamber 82. The details of the dirt cup and filter assemblies do not form a part of the present invention and are therefore not describe herein in detail. A detailed description of the dirt cup and filter assemblies can be found in previously incorporated U.S. Patent Application Serial No. 09/519,106 filed on March 6, 2000. It will be appreciated that other bagless dirt cup assemblies may be employed with the present latch mechanism. For example, a cyclonic dirt with or without filter or without a lid may be employed

The dirt cup assembly is placed on the cleaner by horizontally translating the dirt cup 10 into the cavity 22 (FIG. 2) in the housing 4 and lowering the cup, such that the inwardly stepped portion 58 of the dirt cup is received in the recessed area 34 of the bottom wall 18. When the dirt cup is placed in the cavity as described above, the rear wall 46 of the dirt cup 10 abuts up against the inlet seal 32, with the dirt duct outlet 30 in fluid communication with the dirt cup inlet opening 60. Similarly the bottom wall 44 of the dirt cup abuts up against outlet seal 38 (FIG. 3), with the exhaust opening 36 in fluid communication with the dirt cup outlet opening 62.

Referring to FIGS. 5-9, the dirt cup assembly is retained in place upon the housing 4 by a latching mechanism mounted within the top handle cover 20 (not shown in FIGS. 5-9). As best shown in FIG. 5, the latching mechanism includes a latch plate 100, a cam sleeve 102, and a latch cam 104. The cam sleeve is securely attached to the housing by sliding channels 106 in the edges of the cam sleeve over the edges of a correspondingly shaped recess formed in a retaining wall 108 (FIG. 6) integrally molded with the housing 4. The cam sleeve includes a through hole 110 and a cam post 112 that extends up from an upper surface of the cam sleeve. The through hole 110 is somewhat elongate from front to back.

The latch cam 104 includes a cylindrical cam portion 120, a planar cam flange portion 122, and an actuation lever 124. A pair of diametrically opposed helical cam grooves 126 are formed in the outer peripheral surface of the cylindrical

cam portion. The cam grooves includes a central, substantially helical portion 128 and substantially horizontal lands 130 and 132 at either end. The helical portion of the cam groove may include a first helical portion 134 and second helical portion 136. The first helical portion is formed with a steeper incline than the second helical portion. The cam flange includes a cam slot 138 that has a first cam portion 140 that is concentric to the central axis of the cylindrical cam portion and a second cam portion 142 that is not concentric to the central axis of the cylindrical cam portion. As shown in FIGS. 6 and 8, the second cam portion 142 converges on the central axis of the cylindrical cam portion moving away from the first cam portion.

The latch plate 100 includes a platen 150 having a substantially planar lower surface 152 with a pair of protrusions or bumps 154 extending down therefrom. A cylindrical sleeve 156 extends up from said platen. A pair of diametrically opposed pins 158 extend inward from an inner surface of the sleeve. Three pair of guide flanges 160, 162 and 164 also extend up from said platen. Each pair of guide flanges is closely spaced from each other defining a guide 166, 168, and 170 channel between each pair.

The latch cam 104 is preferably formed of a material having a low coefficient of friction and good wear resistance properties. For example, acetal, or some other suitable material may be employed to form the latch cam. In order to ensure smooth operation and good wear characteristics of the latch mechanism, the plate 100 is preferably made out of a material that is dissimilar to that of the latch cam. For example, if the latch cam is formed of acetal, then the latch plate may be formed out of polycarbonate, ABS, or some other suitable material, as is well understood by one of skill in the art.

The latch mechanism is installed by first inserting the cylindrical cam portion 120 of the latch cam 104 through the hole 110 in the cam sleeve 102, until the cam flange 122 rests on the top of the cam sleeve, with the cam post 112 riding in the cam slot 138, and the cylindrical cam portion extending down below the cam sleeve. The cylindrical sleeve 156 on the latch plate 100 is then passed over the lower end of the cylindrical cam portion 120, with the pins 158 in alignment with open lower ends 172 of the cam grooves 126. Thus, the pins 158 are inserted into and ride in the cam

grooves. The assembly is now mounted to the housing by sliding channels 106 in the side edges of the cam sleeve 102 over edges of a recess in the retaining wall 108, while simultaneously sliding the guide channels 166, 168, and 170 defined by the guide flanges 160, 162 and 164 on the latch plate over guide rails, only two of which 174 and 178 are visible in FIGS. 7 and 9, integrally formed with the housing. The latch cam 104 is now vertically trapped between the latch sleeve 102 and a retaining wall 180 integrally formed with the housing 4, as shown in FIGS. 7 and 9.

The latching mechanism is movable between an unlatched position (FIGS. 6 and 7) and a latched position of (FIGS. 8 and 9), by pivoting the lever 124 from left (FIGS. 6 and 7) to right (FIGS. 8 and 9) and right to left, respectively. When the cam lever is pivoted from left to right, the entire latch cam 104 rotates in the latch sleeve 102. As the latch cam rotates, the pins 158 on the latch plate 100 ride in the helical cam grooves 126, whereby the latch plate is moved downward, and the cam post 112 rides in the cam slot 138. During a first range of motion the cam post rides in the concentric portion 140 of the cam slot, and the latch sleeve 104 rotates about a fixed axis near the front of elongate hole 110 in the latch sleeve. During the final range of motion from unlatched to latched position, the cam post rides in the non-concentric portion 142 of the cam slot. As a result, the latch cam is pulled rearward in the elongate hole 110, whereby latch plate 100 moves rearward relative the housing 4. With this construction, when the latch lever is moved from the unlatched to the latched position, the latch plate is first moved down and then down and back relative to the housing 4. The motion of the latch plate is reversed when the latch lever is moved from the latched to the unlatched position.

In operation, the dirt cup lid 42 is placed on the top of the dirt cup 10. The dirt cup is then held by its handle 56 and inserted horizontally into the front cavity 22 of the vacuum cleaner housing 4. When the dirt cup is fully inserted into the cavity, the dirt cup is lowered to seat the stepped portion 58 of the bottom wall of the dirt cup within the recessed area 34 of the dirt cup housing bottom wall 118. Once the dirt cup is seated within the housing, the latching mechanism is moved into the latched position by moving the latch lever 124 from left to right. As the latch lever is moved through a first range of motion toward the latched position, the latch cam 104 moves

the latch plate down into engagement with the lid 42, such that the bumps 154 on the latch plate are received in the pockets 64 on the lid and the lower surface 152 of the latch plate abuts up against the upper surface 66 of the lid. The first portion 134 of the helical cam grooves 126 is formed relatively steep, so that the latch plate 100 will move quickly down into engagement with the lid during the first range of motion of the lever. During the final range of motion of the latch lever into the latched position, the latch plate moves further down and rearward, as discussed above. Thus, the latch plate presses the lid down on the dirt cup, presses the dirt cup 10 down against the outlet seal 38 and back against the inlet seal 32. The second portion 136 of the helical cam grooves 126 are formed with less of an incline than the first portion, in order to provide a more powerful downward force in the final motion into the latched position for effectively sealing the dirt cup against the exhaust opening 36.

When traveling between the latched and unlatched position, the latch lever 124 is biased down by and travels over a detent ridge 190 integrally formed with a latch cover 192 attached to the housing 4. Upon reaching the latched and unlatched positions, the latch lever snaps over the ends 194 of the detent ridge 190, thereby providing a positive feel to the operation of the latch and positively retaining the lever in the latched and unlatched positions.

The bagless vacuum cleaner 1 is operated as described above with the dirt, dust and debris being filtered from the dirt-laden air stream and collected within the first dirt collecting chamber 80 and the second dirt collecting chamber 82. After a quantity of dirt has accumulated within the first and second dirt collecting chambers, the dirt cup 10 must be removed from the vacuum cleaner 1 for emptying thereof. To remove the dirt cup from the vacuum cleaner housing 4, the user moves the latch lever 124 from right to left into the unlatched position, whereby the latch plate 100 is raised clear of the dirt cup lid 42. The dirt cup 10 is now lifted upwardly and then outwardly by handle 56 for removal from the vacuum cleaner housing and is transported to a waste container. The lid is removed and the contents of the dirt cup are discharged into the waste container by inverting the dirt cup.

Accordingly, an improved dirt cup latching mechanism for a vacuum cleaner that achieves all of the enumerated objectives is provided by the present

invention. While there has been shown and described herein several embodiments of the present invention, it should be readily apparent to persons skilled in the art that numerous modifications may be made therein without departing from the true spirit and scope of the invention. For example, it will be appreciated that the detent feature provided by cooperating elements of the latch cover 192 and the latch lever 124 may alternatively be formed by cooperating elements of the latch lever and the latch sleeve 102. Accordingly, it is intended for the appended claims to cover all such modifications that come within the scope of the invention.

CLAIMS

1. A dirt cup latching arrangement for a vacuum cleaner comprising:

a dirt cup housing having a recess formed in a front side thereof, said recess having a rear wall and at least one of a top and a bottom wall;

a dirt cup for collecting dirt picked up by the vacuum cleaner, said dirt cup being sized to be removably placed in said recess;

said dirt cup housing including a dirt cup latch for securely latching said dirt cup in place in said recess, said dirt cup latch including a latch member that is mounted to said housing on a side of said recess opposite from said at least one of a top and bottom wall; and

wherein said latch member is mounted to move generally vertically relative to said housing into engagement with a top of said dirt cup to vertically retain said dirt cup between said at least one of a top and bottom wall and said latch member, and to move generally horizontally relative to said housing to horizontally retain said dirt cup between said rear wall and said latch member.

2. A vacuum cleaner comprising:

a housing having a recess formed therein, said recess having a bottom wall;

a dirt collecting cup having a lid, said cup being sized and shaped to be received in said housing and rest on said bottom wall; and

a dirt cup latch mounted to said housing, said latch being movable from an unlatched position, in which said latch does not engage said cup or said lid, into a latched position, in which said latch engages said lid and press said lid sealingly in place on said cup and presses said cup, via said lid, against said bottom wall and thereby secure said cup in said recess.

3. A vacuum cleaner according to claim 2, wherein said recess has an inner generally vertical wall, and when said latch is moved from said unlatched into said latched position said latch moves toward said inner wall and presses said cup against said inner wall.

4. The latching arrangement according to claim 1 wherein the latch member includes an actuation lever pivotable along a horizontal plane whereby pivoting of said actuation lever moves the latch member generally vertically and generally horizontally.
5. The latching arrangement according to claim 1 wherein the latch member includes a latch plate and a latch cam operatively connected to said latch plate.
6. The latching arrangement according to claim 6 wherein the latch member is formed with a helical cam groove which is engaged by a pin of said latch plate whereby rotation of said latch member provides for generally vertical movement of said latch plate.
7. A latching arrangement movable between a latched position for retaining a dirt cup to a housing of a vacuum cleaner and an unlatched position for allowing the removal of said dirt cup from the housing of the vacuum cleaner, said latching arrangement including:
a latch cam having an actuation lever for rotating said latch cam about a generally vertical axis; a latch plate operatively connected to said latch cam; a cam sleeve mounted on the housing and positioned between said latch cam and said latch plate; and whereby horizontal translation of the actuation lever of said latch cam imparts a vertical motion on said latch plate.
8. The latching arrangement according to claim 7 wherein:
the latch cam is formed with a helical cam groove;
the latch plate is formed with a pin which is received within the helical cam groove of the latch cam; and
wherein said pin rides within said helical groove when the latch cam is rotated to move the latch plate vertically.
9. The latching arrangement according to claim 7 wherein:
the latch cam includes a planar surface which is formed with a cam slot;

the cam sleeve includes a cam post which is received within said cam slot; and whereby said cam post rides within said cam slot when the latch cam is rotated to impart a horizontal motion on said latch plate.

10. The latching arrangement according to claim 9 wherein a portion of the cam slot is curved to converge on the generally vertical axis, said curved converging portion of the cam slot causes inward horizontal movement of the latch plate.

11. The latching arrangement according to claim 7 wherein the latch plate applies a vertical force on the dirt cup when the latching arrangement is moved to the latched position.

12. The latching arrangement according to claim 11 wherein said dirt cup includes a lid and wherein said latch plate applies the vertical force on said lid of the dirt cup.

13. The latching arrangement according to claim 7 wherein one of the housing and latch plate is formed with a guide channel and the other of the housing and latch plate is formed with a guide rail which is received within the guide channel for guiding the latch plate as the latch plate moves vertically.

14. A vacuum cleaner including:

- a housing having a rear wall, an end wall and being formed with a recess;
- a dirt cup removably mounted within the recess of said housing; and
- a latching arrangement positioned on the housing opposite the end wall for removably retaining said dirt cup within the recess, said latching arrangement having a latch plate movable along a generally vertical axis for applying a vertical force on said dirt cup to vertically retain said dirt cup on said housing, and movable along a horizontal axis for applying a horizontal force on said dirt cup to horizontally retain said dirt cup on said housing.

15. The vacuum cleaner according to claim 14 wherein said dirt cup includes a lid and wherein said latch plate applies the vertical force and the horizontal force on said lid.

16. The vacuum cleaner according to claim 15 wherein a bump extends outwardly from the latch plate and the lid is formed with a pocket, said bump engaging the pocket to align and horizontally retain the dirt cup on the housing.

17. The vacuum cleaner according to claim 14 wherein:

the rear wall of the housing is formed with an outlet opening;

the dirt cup is formed with an inlet opening which is in fluid communication with said outlet opening;

a seal is positioned between about a periphery of one of the inlet and outlet openings whereby the horizontal force applied by the latch plate sandwiches said seal between the rear wall of the housing and the dirt cup to seal the fluid communication between the inlet and outlet openings.

18. A dirt cup latching arrangement substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

19. A vacuum cleaner substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.



Application No: GB 0107255.2
Claims searched: 1,4,5 and 14-17

Examiner: Kathryn Orme
Date of search: 20 June 2001

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): A4F

Int Cl (Ed.7): A47L 9/10, 9/14, 9/16, 9/20

Other: Online: WPI, EPODOC, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2353837 A (WHITE CONSOLIDATED) see page 6 lines 13-16 and figs 2C and 3	
A	US 5659922 (LOUIS) see column 2 lines 56-67, column 3 and figs 4 and 5	
X	US 4405346 (TSCHUDY ET AL) see column 4 lines 40-59 and fig 4	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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